Centre for Philosophy of Natural and Social Science

The London School of Economics
and Political Science
Houghton Street, London WC2A 2AE
Tel: 0171-955 7573
Fax: 0171-955 6869
E-mail: PHILCENT@lse.ac.uk
http://www.lse.ac.uk/depts/cpnss/

The Sigma Club

Presents

A Millennial Debate

THE END OF TIME

between

Dr Julian Barbour

author of *Absolute or Relative Motion?* and *The End of Time, The Next Revolution in Physics*

Dr Fay Dowker

Physics, Queen Mary and Westfield College

Chair: Prof Michael Redhead FBA

CPNSS, LSE

Thursday, 28 October 1999, 5:30 PM

The Old Theatre, Old Building
Houghton Street WC2

All welcome- no tickets

The support of Weidenfeld & Nicolson Publishers is gratefully acknowledged

The London School of Economics is a School of the University of London. It is a charity and is incorporated in England as a company limited by guarantee under the Companies Acts (Reg.No.70527)

I

The End of Time (LSE 28th Oct 1999)

(1.) Philosophers against Time.
Parmenides & Zeno
Kant
Hegel & Bradley
(1908) McTaggart — reject B
A is incoherent
veil & Maya.

(2.) Time without change.
Shoemaker argument (cycles 11 & 13 → 143 = no change)
(2 kinds of universe observed one to change in cycles

(3.) A & B theories
A — C.D. Broad.
B — Moller (Real Time) Grunbaum
Russell.

(4.) Arguments from classical relativity

S.R. args against A-theory, Putnam, Riddiford
Def event are CS-real.
but for A-theory of stein.

G.R
(a) space-time approach
Diff → stretch & compress events in coordinate
Time, but order or time-like world-line is
invariant and also proper time is invariant

P.T.O

(2) canonical approach — constrained Hamiltonian system

$H = 0$, time evolution of 3-geometries is a gauge motion (unphysical degrees of freedom)

but cp Hamilton-Jacobi for Hamilton's principal function

$H' = 0$ and β, β are constants equal to values of $\dot{q}, p$ at initial (but variable) time t_0 (in Hamilton's original formulation)

cp Rovelli's 'moving' constants of motion

Ex the fact that I am at the LSE on the afternoon of 28th October 1999 is a timeless truth

- cp the rocket exploded as it docked at the space station
- the rocket has mass M when it collided with the asteroid

(5) Arguments from quantum gravity

(a) interpolation of the Wheeler-deWitt equation, extracting an 'internal' time variable

(b) fluctuations in the metric may change the distinction between time-like and space-like at very short scales (such as the Planck length) cp spacetime foam?

But does it follow that an effective notion of time may not emerge at larger scales — cp (a) above

III

(6) Solipsism of the present sounds — oh now it's not sounds like A-theory rhetoric!

Rebuttal of sceptical arguments (about the reality of the past & de) are really responses to the best explanation of the effects of the many causal chains flowing from each past event (Eg I dropped a stone in the water explains the splash, the now, the retreating etc)

(7) What about the future? metaphor & 'growing' time capsules suggest an ordering of news into the past and into the future — Again A-theory talk

(8) Supertasktarium spoilers is all down to! was Wisdom's argument for developing geometrodynamics in the early 1960s.

(9) I am a realist B-theorist. Events happening when they do are tenseless truths. But different events can happen at different times and that it what constitutes change Time is that dimension of reality which allows for (but perhaps does not necessitate) change. ↖ reverse Shoemaker argument

(10) Should philosophers take lessons from the physicist? Can you read off metaphysics from physics?

P.T.O

IV

11) Interbellic of Probability when all outcomes are realized

Subjective Probability seems all relevant
If a I have a dog carrying, I am
told, I not told it is white, but its
rational support may belief that this
dog as I dream it is red, even
stronger support is offered I don't
inspection! Seeking for structural
reasons.
But reasons for belief in X are not
typically explanations of X.

I believe with is real because of
Laws phenomena, circumstances etc
were part of the explanation by the it still
is real.

THE END OF TIME

1. The unreality of time

Parmenides, Zeno
Kant
Hegel(?) and Bradley
McTaggart

2. Time without change

Shoemaker argument

3. A and B theories of time

↑ Broad

↑ Russell, Grünbaum
Mellor.

4. Arguments from classical relativity

S.R. Angts against A theory
Putnam, Ritdijk ek
All events are co-real
But cp response by Stein

G.R

(a) space-time approach.
under Diff. order on a
time-like world-line and
proper time are invariant

(b) Canonical 3+1 approach
constrained Hamiltonian
system, $H=0$, Time
evolution of 3-geometries via
York Motion

but cf Hamilton-Jacobi theory

↳ Carlo Rovelli's 'moving' constants of motion.

5. Arguments from quantum gravity

(a) Interpretation of Wheeler-de Witt eqn., extracting an 'internal' time variable

(2) Fluctuations in metric eliminate distinction between space and time over very short scales

But can an effective notion of time emerge at larger scales?

6. Solipsism of the present

Refutal of sceptical arguments involve inference to the best explanation

7. What about the future?

metaphor of 'growing' time capsules suggests an ordering? — in time?!

8. Superstantivalism

Space-time is all there is!
cf. early Wheeler on geometrodynamics.

9. Should philosophers take lessons from the physicists? Can you read off metaphysics from physics?

10. Interpretation of probability when all outcomes are realized

Subjective interpretation seems appropriate.

But reasons for belief in a structured 'new' are not explanations of that structure.

11. I am a resolute B-theorist!

Events happening under they do are timeless truths.

But different events can happen at different times, and this is what constitutes change.

Time is that dimension of reality which allows for (but perhaps does not necessitate) change.